M A T H E M A T I C S

GRADE LEVEL CONTENT EXPECTATIONS

Looking Across the Grades

MICHIGAN
Department of
Education

Office of School Improvement

www.michigan.gov/mde

Looking Across the Grades

This "cross-grade" format allows grade levels to be easily compared with each other. You will find a separate matrix for each strand. Each strand has then been subdivided into broader, more conceptual groupings called "Domains" to allow for cross grade comparisons of the expectations. In several of the strands, the domains are similar to the standards in *Principles and Standards for School Mathematics* from the National Council of Teachers of Mathematics.

The grades have been grouped in grade bands across each page, i.e. grades kindergarten through 2nd grade can viewed across a page, 3rd through 5th across a page and 6th through 8th across a page. Within the domains of each grade band the expectations have been lined up to show progression on a concept from one grade to the next. For instance, progression in "compare and order numbers" can be viewed across kindergarten, first and second grades. It can also be picked up and viewed across the grades in the 3rd – 5th grade band.

To allow for ease in referencing expectations between the grade-level format and the cross-grade format, each expectation has been coded with strand, domain, grade-level, and expectation number. For example:

M.UN.00.0	M	–	indicates *Measurement* strand
	UN	–	from *Units & Systems of Measurement* domain of the *Measurement* strand
	00	–	kindergarten expectation
	01	–	first expectation in the grade-level view of the *Measurement* strand.

MICHIGAN
Department of
Education
Office of School Improvement

www.michigan.gov/mde

GRADE LEVEL CONTENT EXPECTATIONS

Number and Operations

NUMBER & OPERATIONS

ALGEBRA

MEASUREMENT

GEOMETRY

DATA & PROBABILITY

The main goals in the Michigan Mathematics Grade Level Content Expectations relative to *Number and Operations* are in the areas of:

- Meaning, notation, place value, and comparisons (ME)
- Number relationships and meaning of operations (MR)
- Fluency with operations and estimation (FL)

Within each of these categories, the expectations build to progressively incorporate work with expanding sets of numbers: whole numbers, fractions, decimal fractions, ratio, percentages, rational numbers, and the real numbers. There is strong emphasis on using connections within the structure of number systems (e.g., the inverse relationship between addition and subtraction, or multiplication and division) as conceptual organizers for supporting student learning. The GLCE in *Number and Operations* also are designed to enable teachers and students to take up clusters of related ideas and procedures within a given grade level, sometimes working from the basic informal introduction of an area completely through computational fluency within a particular grade.

Several of these expectations call for fluency, by which we mean efficiency and accuracy in computation. Teachers should help students become fluent in calculation by building from experience with concrete objects and pictorial representations, encouraging use of strategies and algorithms that can be used generally, and by emphasizing conceptual relationships among operations, through such tools as fact families. Fluency may depend on recall and automaticity with basic number facts, or on use of computational strategies.

MICHIGAN
Education Department of

Office of School Improvement

www.michigan.gov/mde

Measurement

The main goals in the Michigan Mathematics Grade Level Content Expectations relative to *Measurement* are in the areas of:

- Units and systems of measurement (UN)
- Techniques and formulas for measurement (TE)
- Problem solving involving measurement (PS)

Across the grades, students should build their repertoire of measurement concepts and skills in order to understand the attributes of time, length, area, volume, weight, capacity, money, and temperature. The concepts can be developed using concrete models and measurement with non-standard units; students also need to be proficient in measuring with common tools. In the upper elementary and middle grades, the expectations call for understanding of equivalence of measurement units, knowledge of measurement formulas, and the application of measurement concepts in applied problems and contexts. Expectations in *Measurement* are related to expectations in *Geometry*; also, the *Measurement* strand allows for reinforcement and interesting contexts for problem solving involving number.

NUMBER & OPERATIONS

ALGEBRA

MEASUREMENT

GEOMETRY

DATA & PROBABILITY

MICHIGAN Department of Education

Office of School Improvement

www.michigan.gov/mde

GRADE LEVEL CONTENT EXPECTATIONS

Geometry

The main goals in the Michigan Mathematics Grade Level Content Expectations relative to *Geometry* are in the areas of:

- Geometric shape and properties, and mathematical arguments (GS)
- Location and spatial relationships (LO)
- Spatial reasoning and geometric modeling (SR)
- Transformation and Symmetry (TR)

In the early grades the expectations focus heavily on recognizing, creating, describing, and comparing the basic two-dimensional and three-dimensional geometric shapes. Numeric and geometric patterns are examined, and describing location and modeling objects begins. In upper elementary grades, description of shapes and their properties is refined, the relationships among shapes are considered and analysis of symmetry and motion begins. In the middle school years the expectations emphasize special angle, line, and plane relationships, and work with congruence and similarity. Understanding of the Pythagorean Theorem is developed and applied. Combining this background with understanding of the related *Measurement* expectations for perimeter, area, and volume, students at the end of eighth grade are expected to have the tools they need to understand and model geometric situations, solve common real world problems involving geometry, and justify geometric arguments.

MICHIGAN Department of
Education
Office of School Improvement

www.michigan.gov/mde

Download Geometry Matrix >

GRADE LEVEL CONTENT EXPECTATIONS

Data and Probability

The main goals in the Michigan Mathematics Grade Level Content Expectations relative to *Data and Probability* are in the areas of:

- Data representation (RE)

- Data interpretation and analysis (AN)

- Probability (PR)

In the early grades, the expectations focus heavily on working with given data sets and representing them graphically. In the middle school years statistics that describe data sets are introduced and more sophisticated data representations are created. Students are asked to solve problems using information from data sets. Basic ideas from probability are introduced in depth in the middle grades, in connection with ideas in the *Number and Operations* strand in the area of ratio. By the end of grade eight, students are expected to have a working understanding of fundamental ideas about data and probability, as an element of general quantitative literacy. Note that the *Data and Probability* strand provides the opportunity to reinforce number operations and representation.

NUMBER & OPERATIONS

ALGEBRA

MEASUREMENT

GEOMETRY

DATA & PROBABILITY

MICHIGAN
Department of
Education
Office of School Improvement

www.michigan.gov/mde

Download Data and Probability Matrix >

NUMBER & OPERATIONS

ALGEBRA

MEASUREMENT

GEOMETRY

DATA & PROBABILITY

Algebra

The expectations in the area of *Algebra* are perhaps the most ambitious of those in any strand. This document calls for a substantial emphasis on algebra in the middle grades, and assumes a very strong foundation in number concepts and operations as the basis for that algebra emphasis. With most of the major conceptual and computational work in number well underway and nearly complete by the end of sixth grade, an emphasis on algebra is possible.

The main goals in the Michigan Mathematics Grade Level Content Expectations relative to *Algebra* are in the areas of:

- Patterns, relations, functions and change (PA)

- Representation (RP)

- Formulas, expressions, equations, and inequalities (FO)

The expectations included here are intended to enable all students to have a solid grounding in the fundamental areas of algebra, including functions and the use of algebraic symbols and tools, by the end of the eighth grade. As in all other strands, students will be proficient when they have not only procedural fluency with certain techniques, but also a strong conceptual base for understanding the key ideas of algebra. Early work in number, particularly understanding of number properties and the operations' relationships with one another, is central to understanding algebra in a more formal way. Likewise, emphasis on number patterns can provide a useful basis on which to build the concepts of function. (The expectations from *Number and Operations* are indicated in gray in their respective *Algebra* categories).

Download Algebra Matrix >

MICHIGAN
Education
Department of
Office of School Improvement

www.michigan.gov/mde